FOCUSED FEASIBILITY STUDY

INDUSTRIAL EXCESS LANDFILL
STARK COUNTY, OHIO

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PREPARED BY:

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NOTE: Tables or figures which are listed in the Table of Contents but are not available in this document have been marked with an asterisk (*) in the bookmarks lilst. You can find them at any of the repository locations for this document.

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ACRONYMS AND ABBREVIATIONS

ARAR	Applicable or Relevant and Appropriate Requirement
CAG	Community Advisory Group
CFR	Code of Federal Regulations
EPA	U.S. Environmental Protection Agency
FFS	Focused Feasibility Study
HELP	Hydrologic Evaluation of Landfill Performance
IEL	Industrial Excess Landfill
MCL	Maximum Contaminant Level
MNA	Monitored Natural Attenuation
MVS	Methane Venting System
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPDES	National Pollutant Discharge Elimination System
OAC	Ohio Administrative Code
OEPA	Ohio Environmental Protection Agency
OSWER	Office of Solid Waste and Emergency Response
PPB	Parts per billion
PRP	Potentially Responsible Party
PRG	Preliminary Remediation Goal
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
ROD	Record of Decision
SDWA	Safe Drinking Water Act
TBC	To be Considered
VOC	Volatile organic compound

1. INTRODUCTION

This report describes the results of a focused feasibility study (FFS) for the Industrial Excess Landfill (IEL) Superfund Site in Uniontown, Ohio. The FFS was prompted by a petition on behalf of the "Responding Companies" (The Goodyear Tire & Rubber Company, Bridgestone/Firestone, Inc., the BF Goodrich Company, and GenCorp). The petition asked EPA to consider replacing the current remedy - an engineered cap - with a biodiverse phyto-cap / enhanced natural attenuation remedy.

EPA agreed to consider the petition for two principal reasons: (1) Improvements in groundwater quality: The rationale for the containment remedy EPA selected previously was primarily the protection of ground water. EPA believed that containment of wastes in the landfill would have to be enhanced by construction of a new landfill cap in order to prevent groundwater quality from deteriorating. However, for the most part since 1988, despite the fact that a new cap has never been installed, groundwater quality at IEL has steadily improved, with few exceedances of federal drinking water standards offsite. Except for elevated benzene levels around one monitoring well, groundwater quality has improved onsite as well, with contaminant levels approaching federal drinking water standards. As a result, EPA concluded it could consider an alternative to a traditional containment approach. (2) State and community acceptance of an alternative to containment: Based on discussions with the Board of Lake Township Trustees, EPA believes that there has been a significant change in community acceptance of the engineered cap that EPA selected previously. There now appears to be considerable support for an alternative that would permit more flexibility in

land use, including use of the site as a nature preserve or wildlife habitat. The Ohio EPA has also indicated its willingness to consider an alternative to the traditional landfill-cap approach.

The focus of this study is a comparison of the remedy proposed by the petitioners with two other alternatives: the current remedy as amended in March 2000; and no action. The FFS evaluates the alternatives in terms of the 9 criteria set forth in Section 300.430(e)(9)(iii) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

2.0 BACKGROUND

2.1 Site Description/Location: IEL is a privately-owned 30-acre mixed-waste landfill, located at 12646 Cleveland Avenue, Uniontown, Ohio, approximately 10 miles southeast of Akron (see Figure 1). The landfill closed in 1980. Homes are located principally to the north, west, and southwest of the site. A sod farm is located to the east of the landfill, on the other side of a narrow stream called Metzger Ditch. Covered with overgrown grasses, small trees, and shrubs, the site itself is gently sloping, with the highest elevation towards the northwest corner. The area around IEL is rural/residential - a mixture of residential, agricultural, commercial, and light industrial use. According to the 2000 Census, 2,802 people live in Uniontown, while Lake Township has a population of 25,892. Located between Akron and Canton, the area has become increasingly residential with many new homes being built nearby.

2.2 Site History: For a more complete description of the site history, please refer to the July 1989 ROD and March 2000 ROD Amendment, both of which are in the information repositories for the IEL Site.[1] IEL was used for the disposal of a variety of municipal, commercial, and industrial wastes. The rubber industry in the Akron area sent fly ash, spent latex and solvents to the site for disposal. Based on available records, it was estimated that approximately 780,000 tons of wastes, along with about 1,000,000 gallons of liquid wastes, were disposed at the site before it closed in 1980. The site was covered with two feet of soil and seeded in 1980 under the terms of a court order. In 1983, complaints by community residents prompted investigations to ascertain whether drinking water was

[1]There are 2 information repositories for the IEL Site: (1) Lake Township Clerk's Office, 1260 Market North, Hartville, Ohio 44632; and (2) Hartville Branch Library, 411 East Maple Street, Hartville, Ohio 44632.

contaminated and if health risks existed because of the site. The results of these investigations led EPA to propose to list this site on the National Priorities List (NPL) in October 1984. Its listing on the NPL was made final in June 1986. EPA initiated a remedial investigation (RI) of the site in 1985, culminating in the issuance of the RI report in July 1988.

2.3 Interim Measures: While the RI was being conducted, EPA took action at the site to reduce/eliminate any immediate threat to public health associated with conditions at the site. In 1986, an active methane venting system (MVS) was installed to prevent off-site migration of explosive levels of methane gas to adjacent homes. In 1987, EPA installed air strippers in eight residences and two businesses in response to the presence of low levels of vinyl chloride and other volatile organic compounds in several drinking water wells. Also in 1987, prior to the selection of an overall remedy for the site, EPA issued an operable unit ROD, calling for approximately 100 homes in the path of groundwater contamination from the landfill to be connected to a municipal water supply. In 1991, in response to an EPA administrative order, the Responding Companies completed the installation of the alternate water supply called for in the 1987 ROD. Since the installation of the IEL alternate water supply in 1991, other areas in the vicinity of the landfill have also been connected to municipal water systems (see Figure 2).

2.4 The July 1989 Record of Decision: At the time the July 1989 ROD was being prepared, a plume of groundwater contamination attributable to IEL was observed to extend approximately 1,000 feet west of the site. This finding was based on sampling nearby residential wells and the 28 monitoring wells EPA constructed during the RI (nested wells designated as MW-1 through MW-12). The Baseline Risk Assessment prepared as part of the 1988 remedial investigation/feasibility study (RI/FS) for IEL identified unacceptable risks from exposure to groundwater

contaminants with coming from the landfill were present. Contaminants of concern exceeding federal drinking water standards in ground water included benzene, vinyl chloride, tetrachloroethylene, 1,2 dichloroethane, barium, and nickel. Another risk driver was the off-site migration of landfill gas threatening homes located adjacent the landfill. Based on this and other information from the 1988 RI/FS, EPA ultimately prescribed the following remedy in the July 1989 ROD:

- Multi-layer RCRA Subtitle C cap over the entire surface of the landfill
- Expansion of existing methane gas venting system
- Groundwater pump and treat system
- Pumping of ground water to maintain the water table beneath the bottom of landfill wastes, preventing further contamination of ground water
- Fencing
- Deed restrictions on future use of the property
- Monitoring of the cap, groundwater pump and treat system, and methane venting system to ensure the remedy continued to be effective

2.5 The March 2000 ROD Amendment: After issuing the 1989 ROD, EPA installed 30 new monitoring wells at IEL (MW-13 through MW-28) and continued to monitor the groundwater. EPA conducted its last groundwater survey in September 1998. With U.S. and Ohio EPA oversight, the Responding Companies conducted additional groundwater surveys in 1997 and 1998. A comparison of groundwater data collected in the 1988 RI with data from 1997 and 1998 showed levels of contaminants of concern decreasing. Organic compounds such as benzene and vinyl chloride were no longer detected above federal maximum contaminant levels (MCLs) for drinking water outside of the landfill boundaries While certain metals were detected above MCLs outside the landfill, the total number detected was fewer than in 1988, the concentrations were lower on average, and the

exceedances appeared to be sporadic in nature. Sampling of nearby residential wells in 1998 detected few metals, and those found were at concentrations well below MCLs. Because of these changes in site conditions, the Agency concluded that a pump-and-treat system was no longer justifiable, and that this component of the 1989 remedy should be eliminated. Groundwater monitoring data and technical evaluations the Agency used in making this decision can be found in the IEL information repositories.

The following remedy components were prescribed in the March 2000 ROD Amendment:

- Modified landfill cap (clay liner eliminated)
- Natural attenuation of contaminants in ground water offsite
- Expansion of existing methane venting system (MVS) to collect and treat landfill gases
- Monitoring the cap, ground water, and MVS to ensure effectiveness
- Deed restrictions on the future use of the site property
- Fencing

3.0 FORMULATION OF ALTERNATIVE TO THE CURRENT REMEDY

This section of the Focused Feasibility Study sets out the factors underlying EPA's decision to consider changing the current remedy together with the factors involved in EPA's formulation of a new remedial alternative.

3.1 Significant New Information Affecting IEL:

The reasons for EPA's willingness to consider a new remedy all come under the category of significant new information affecting IEL. This information is summarized below.

Continuing Improvements to Groundwater Quality: The most important basis for EPA's decision to consider a new remedy is new data tending to confirm the hypothesis that natural attenuation is degrading contaminants in ground water within the landfill as well as offsite. Improvements in groundwater quality first noticed in 1997-1998 continued to be observed in 2000-2001 data. (See Figure 3 and Appendix A. The latest groundwater potentiometric map is also attached to this report as Figure 4). With the exception of benzene levels in the north central portion of the site, the number of contaminants detected and the concentrations at which they are found are generally following a downward trend. Also, a comparison of 2000-2001 groundwater data with health and risk-based values suggests the onsite groundwater conditions to be close to meeting these values for contaminants of concern such as vinyl chloride (VC), tetrachloroethene (PCE), 1,2 dichloroethane (1,2 DCA), and nickel. Except for 3 onsite monitoring wells, the levels of benzene appear to be generally following this trend (see Table 1). The use of latest sampling techniques (low-flow sampling) in the recent sampling rounds has provided a more accurate reading of metals concentrations in ground water at the site.

Change in Local Government Position Towards Capping: In July 2000, the local government for the area around IEL - the Lake Township Trustees - asked EPA to delay construction of the landfill cover prescribed in the March 2000 ROD Amendment The Trustees subsequently expressed interest in finding a remedy that would protect public health but would also provide more flexibility in terms of land use than a traditional engineered cap. The cap selected by EPA in previous remedy decisions would require restricting vegetation to grass over the 30-acre site. No public access was contemplated. The Trustees have urged EPA to consider remedial alternatives that would permit more varied vegetation and public access for recreational uses, e.g., as a nature preserve.

Petition from the Responding Companies: In July 2000, the Responding Companies asked EPA whether it would be willing to consider a different concept for remediating the site: a biodiverse phytocap/natural attenuation remedy. In response, EPA said that it would be willing to at least consider such a proposal. In November 2000, the Responding Companies submitted a written petition to EPA, formally requesting a change in the overall site remedy for IEL. Specifically, the Responding Companies proposed replacing the conventional cap described in the March 2000 ROD Amendment with a vegetative cover involving the selective planting of additional trees and other plants. According to the Responding Companies, the plantings would: (1) provide a varied habitat for wildlife and create an attractive landscape; and (2) enhance the natural attenuation processes evident at the site. (A fuller discussion of the Responding Companies' proposal is provided below, in the description of Alternative 3).

U.S. EPA Reaction: Subsequent to Lake Township Trustees' request, EPA agreed to delay construction of the remedy prescribed in the March 2000 ROD Amendment. The Agency also agreed to review the Responding Companies'

suggested alternative to the March 200 remedy. The results of EPA's review are summarized in this report.

Ohio EPA Reaction: OEPA expressed its willingness to consider alternatives to constructing a traditional landfill cover at IEL, including the approach described in the November 2000 petition from the responding parties.

3.2 Remedial Action Objectives: In formulating an alternative to the current remedy, EPA has kept in mind several remedial action objectives for the landfill portion of the IEL site:

- *Reduce migration of contaminants in waste to ground water;*

- *Prevent potential future exposure to contaminants by ingestion and through dermal contact;*

- *Return ground water to beneficial use wherever practicable, within a reasonable time frame, given the circumstances of the site; and*

- *Ensure continued protection of community from undue risks posed by landfill gas.*

3.3 Additional Considerations:

A. *Future Land Use Considerations:* Under the March 2000 remedy - a multi-layer landfill cap - the surface of the landfill, some 30 acres, was to be completely off-limits. Maintenance of the site as a fenced grassland would be necessary in order to ensure the integrity of the cap. However, with a vegetative cover/

natural attenuation remedy, it is possible that land use could be more flexible. Informal discussions among local government officials, EPA, OEPA, and the Responding Companies concerning future land use with a non-cap remedy have taken place. All parties agree that, for the foreseeable future, constructing homes on top of the landfill is not a realistic possibility, in spite of the land being zoned residential (the local zoning board temporarily re-zoned the site as commercial when the landfill was operating, but was to revert to residential after operations ceased). The Responding Companies conducted field investigations on the ecology of the landfill, and, based on that work, they have proposed creating a nature preserve. Lake Township has expressed interest in this proposal, particularly insofar as it might permit opening the landfill to the public through such amenities as walking trails, etc. Additional studies of the risks, if any, that surface conditions might pose to visitors would be necessary in order to evaluate the feasibility of opening the landfill to that kind of recreational use. At present, insufficient data are available. Nevertheless, because of the attenuation of contamination in ground water onsite together with the slowdown in gas production, it seems possible that further studies might indeed show that the landfill is safe for use as a nature park, with trails, overlooks, picnic areas, etc.

With the help of a $100,000 grant from EPA under the Superfund Redevelopment Initiative, Lake Township is exploring the potential for redeveloping the site in a phased approach, beginning with the 12-acre portion of the site that was never used for landfill operations (i.e., property EPA purchased in 1991). The cooperative agreement between EPA and Lake Township calls for the latter to complete a redevelopment plan and market analysis for the site. A community advisory group (CAG) has been formed to evaluate various options for redeveloping this land. The CAG has been meeting,

more or less, on a monthly basis since November 2000 for the purpose of discussing the redevelopment efforts and progress being made under the EPA grant.

B. *Landfill Gas Generation:* The MVS has been operating since 1987, controlling the offsite migration of landfill gases. Prior to its construction and use, landfill gases threatened the health and welfare of residents living immediately next to the landfill. While the MVS continues to operate today under OEPA oversight, the homes and businesses most threatened by landfill gases are no longer there. They were purchased by EPA in 1991 so that a cover could be placed on the landfill. They were later demolished.

Methane data collected over the years have shown a downward trend in the levels of methane found in the landfill gas. According to OEPA, the system is no longer operating automatically, due to what appears to be low methane levels. Presently, the system is manually operated 2-3 times a week by OEPA's contractor to ensure adequate flaring and efficiency. Although the MVS appears to be adequately addressing the threat, if any, posed by existing landfill gas levels, a thorough assessment of site-wide gas emissions will be necessary to determine the appropriate operating mode (i.e., passive versus active) the system will be operating in the future. Also, as mentioned above, because of new ideas about future land use at the site, landfill gas needs to be evaluated in terms of its potential risk to visitors.

C. *Areas for Additional Investigation:*

Elevated benzene readings: High concentrations of benzene have been observed in the north-central portion of the landfill near MW-14 since 1997. At MW-14s,

the concentration of benzene ranged from 1,900 to 16,000 parts per billion (ppb) from March 1997 to March 2001. For comparison, the maximum contaminant level (MCL) under the Safe Drinking Water Act for benzene is 5 ppb. In the past, EPA postulated that the elevated benzene levels might not reflect the true groundwater quality, but, rather, result from a loss of mechanical integrity in the wells (i.e, kinking or bent), allowing landfill leachate to migrate into compromised well casings. Factors suggesting that the benzene findings are not accurate include the fact that there have been no other hot spots found at the site to date, and the fact that there is no correlation with benzene levels at upgradient and downgradient wells. Generally, levels of benzene levels found in these wells were low to nondetect. To test the hypothesis that the high benzene readings are spurious, new wells are being installed in the area in question. Once data from these wells are available, EPA should be able to determine whether there is a true benzene hot spot in the landfill or not.

Metallic objects outside the landfill boundary: A limited geophysical survey conducted as part of the preliminary site work by the Responding Companies in October 2000 indicated the presence of metallic objects buried underneath an area between the fence line and former Uniontown Tire Shop (i.e., outside of the landfill boundary). Some additional investigation is necessary to determine whether these objects are affecting ground water, i.e., whether they are contributing metals to offsite ground water.

Assessment of risks to visitors onsite: As noted above, future land use of the landfill proper (as opposed to the residential and commercial properties EPA purchased in 1991) is projected to be a nature preserve with the potential for public recreational access. A risk assessment is necessary to evaluate what risks, if any, surface conditions at the landfill might pose to visitors. If it were

determined that no significant risks are present, EPA could examine whether the current perimeter fence is still necessary.

3.4 Applicable or Relevant and Appropriate Requirements:

3.4.1 Introduction*:* Applicable or Relevant and Appropriate Requirements (ARARs) include substantive provisions of any promulgated Federal or more stringent State environmental standards, requirements, criteria, or limitations that are determined to be legally applicable or relevant and appropriate requirements for a Superfund site or action.

Applicable requirements are those clean-up standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under Federal or State law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstances found at a Superfund site.

Relevant and Appropriate requirements are requirements that, while not legally "applicable" to circumstances at a particular Superfund site, address problems or situations sufficiently similar to those encountered at the site that their use is well-suited. The classification of a regulation as "applicable" is fairly straightforward: It involves checking whether the circumstances at the site fall squarely within the definition provided in the regulation of the regulated activity or entity. The classification of a regulation as "relevant and appropriate," on the other hand, involves an exercise of EPA's considered judgement. EPA may pick and choose within a regulation, classifying parts as relevant and appropriate, and dispensing with the rest. However, once EPA determines that a requirement is relevant and appropriate, it must be complied with as if it were applicable.

To be Considered (TBC): In addition to legally binding laws and regulations, many Federal and State environmental and public health programs also develop criteria, advisories, guidance, and proposed standards that are not legally binding, but that may provide useful information or recommended procedures. These materials, commonly referred to as "To Be Considered" (TBC), are not potential ARARs, but are evaluated for each Superfund site to set protective cleanup level targets. Chemical-specific TBC values such as health advisories and reference doses are often used in the absence of ARARs or where ARARs are not sufficiently protective to develop cleanup goals. Other TBC materials such as guidance and policy documents developed to implement regulations may be considered and used as appropriate where necessary to ensure protectiveness. If no ARARs address a particular situation, or if existing ARARs do not ensure protectiveness, TBC advisories, criteria, or guidelines can be used to set cleanup goals.

3.4.2 Types of ARARs: EPA has identified three categories of ARARs for Superfund remedial actions: *A) Chemical-Specific, B) Action-Specific, and C) Location-Specific*.

Chemical-Specific ARARs

Chemical-specific ARARs are typically health-based numerical criteria which are used to establish acceptable concentrations or amounts of a chemical that may be discharged to or present in the environment. The following are the chemical-specific ARARs for IEL:

- *Safe Drinking Water Act (SDWA*): Maximum contaminant levels (MCLs) under the Safe Drinking Water Act (SDWA), 40 C.F.R. 141. MCLs are enforceable standards for public drinking water supply systems which

have at least 15 service connections or are used by at least 25 people. These requirements are not directly applicable since ground water impacted by IEL is used as a private, not a public water supply. However, because ground water down gradient of IEL is potentially a public drinking water source, EPA considers MCLs to be relevant and appropriate requirements for this site.

- *Ohio Administrative Code (OAC)*: Section 3745-81 of the Ohio Administrative Code (OAC) relates to MCLs for organic and inorganic contaminants of concern. Relevant and Appropriate.

- *EPA-Developed Risk-Based Preliminary Remediation Goals (PRGs):* EPA-Region 9's preliminary remediation goals (PRGs) are risk-based tools for evaluating and cleaning up contaminated sites. For this site, PRGs are classified as TBC.

Table 2 is provided, listing the cleanup levels associated with each contaminant of concern for the site.

Action-Specific ARARs

Action-Specific ARARs are requirements that pertain to the particular remedial actions that are proposed at the site (e.g., monitored natural attenuation, landfill gas control, etc.). The following are the actions involved in one or more of the remedies being considered and the action-specific ARARs associated with them:

- *Capping/containment of wastes:*

  State cap/operating requirements for hazardous landfills and associated

TABLE 2

Cleanup Levels for IEL Contaminants of Concern

Compound	*Concentration (ppb)*	*Cleanup Basis*
1, 2 Dichloroethane (DCA)	5	MCL - Final
cis 1,2 Dichloroethene (DCE)	70	MCL - Final
Acetone*	610	R9 PRG
Benzene	5	MCL - Final
Chloroethane	4.6	R9 PRG
Methylene Chloride*	43	R9 PRG
Vinyl Chloride	2	MCL - Final
Arsenic	10**	MCL - Final
Chromium	100	MCL - Final
Lead	15	MCL - Action Level
Nickel	730	R9 PRG
Thallium	2	MCL - Final

* Reported as detected, but probable laboratory artifact

** Effective January 22, 2001. Drinking water systems need to comply with this standard by 2006.

performance standards: OAC 3745-57-03(A) through (I); OAC 3745-57-01(A) through (D). Relevant and Appropriate.

State landfill closure and post-closure care requirements: OAC 3745-57-10(A) & (B), 3745-55-11(A)-(C) and 3745-55-17(B). Relevant and Appropriate.

- *Monitored natural attenuation*

  "EPA Guidance on MNA at Superfund Sites, RCRA Corrective Action, and UST sites," April 1999: OSWER Directive 9200.4-17P. TBC.

- *Stormwater Discharge*

  40 C.F.R. 122.26(a) - substantive requirements of NPDES stormwater regulations. Applicable.

- *Landfill Gas Management:*

  OAC 3745-16-02(B) and (C) establishes stack height for contaminant sources based on good engineering practices - Applicable to any stack associated with gas treatment at IEL if the stack is a source of air contaminants. OAC 3745-17-05 prohibits degradation of air quality in any area where air quality is better than required by Ohio's non-degredation policy - Applicable to stack emissions associated with gas treatment at IEL. OAC 3745-21-07(A), (B), (G), (I), and (J), OAC 3745-21-08(A) through (E), and OAC 3745-23-01, 3745-23-02(A) and (B), and 3745-23-06 relate to organic, CO2, and NO2 emission

controls at stationary sources - Applicable to any organic, CO2 or NO2 emissions associated with gas treatment or venting. OAC 3745-17-02(A), (B), and (C) establish specific standards for total suspended solids - Applicable to stack emissions associated with landfill gas venting.

- *Remedy Construction Activities:*

  29 C.F.R. 1910.120 establishes proper training and personal requirements for workers who may be exposed to hazardous substances - Applicable to remedial actions involving workers on-site. Ohio Revised Code (ORC) 3734.02(H) prohibition against filling, grading, excavation, etc., on land where hazardous waste facility was operated - Relevant and Appropriate. ORC 3734.02(I) prohibition against certain air emissions including particulate matter, dust, smoke, etc. from a hazardous waste facility - Applicable to construction activities. OAC 3745-17-08 refers to control of fugitive dust emissions at sites where certain activities (e.g., grading, demolition, clearing, etc.) may be expected - Applicable. OAC 3745-17-02(A), (B), and (C) establish specific standards for total suspended solids - Applicable to construction activities. OAC 3745-15-7 prohibits air emissions which create a public nuisance. Applicable to remedial activities that cause air emissions, e.g., excavation, cap construction, demolition of buildings, etc.

- *Well Abandonment*:

  OAC 3745-9. Applicable.

Location Specific ARARs

Location-specific ARARs are restrictions placed on the concentration of hazardous substances, pollutants or contaminants or the conduct of activities because they are in a specific location. Examples include regulations that apply to flood plains or historic sites. At IEL, there are a number of standards that are applicable or relevant or appropriate because of what IEL is - a former landfill - rather than because of what actions may be taken there, e.g., capping or natural attenuation. These standards are best thought of as location specific ARARs. They include the following:

- *Landfill Gas Management:* OAC 3745-27-12 (A), (B), (D), (E), (M), and (N) cites monitoring requirements for explosive gases at sanitary landfills - Applicable. OAC 3745-76 establishes standards for control of non-methane organic compound emissions at old landfills - Relevant and Appropriate.

- *Air Emissions:* ORC 3734.02(I) prohibition against certain air emissions from a hazardous waste facility - Applicable.

- *Noxious Smells:* ORC 3767-13(A) prohibits noxious exhalations or smells - Relevant and Appropriate.

- *State Requirements on Groundwater Protection:* OAC 3745-54. Substantive requirements of landfill permit that includes standards to ensure protection of groundwater. TBC.

For convenience, an ARAR table (see Table 3) has been prepared for quick reference to the various ARARs for this site.

TABLE 3
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)
AND TO BE CONSIDERED MATERIAL (TBC) FOR THE
INDUSTRIAL EXCESS LANDFILL SITE

ARAR or TBC	Legal Citation	Classification	Summary of Requirement	Further Detail Regarding ARARs in the Context of the Remedy
I. CHEMICAL-SPECIFIC				
A. Water				
1. Safe Drinking Water Act	42 U.S.C.§§300f et seq			
Maximum Contaminant Levels (MCLs)	40 C.F.R.§§141.11-12 and 141.61-62	Relevant and Appropriate	MCLs are enforceable standards for public drinking water supply systems which have at least 15 service connections or are used by at least 25 persons. These requirements are not directly applicable here since, to the extent that groundwater impacted by IEL is used for drinking water, it is used as a private, not a public water supply. However, because of this private use, and because the aquifer downgradient from IEL is potentially a public drinking water source, EPA considers MCLs to be relevant and appropriate requirements for this site.	MCLs constitute the groundwater cleanup levels for this site. Natural attenuation processes must restore groundwater outside of and downgradient from the landfill boundary to MCLs .
2. Ohio Administrative Code (OAC) governing MCLs for organic and inorganic contaminants of concern.	OAC 3745-81-11(A), (B), & (C), 3745-81-12(A),(B) & (C)	Relevant and Appropriate	3745-81-11(A), (B), & (C): Maximum contaminant levels for inorganics; 3745-81-12 (A), (B), & (C): Maximum contaminant levels for organics.	
3. EPA-developed risk-based preliminary remediation goals (PRGs)	EPA-Region 9 Preliminary Remediation Goals (PRGs) - Updated 10/1/99	To Be Considered	Risk-based tools for evaluating and cleaning up contaminated sites. These and similar documents produced by EPA are being used to streamline and standardize all stages of the risk decision-making process	Will be considered for setting up cleanup standards for contaminants of concern with no associated MCL. The Region 9-developed PRGs are chemical concentrations that correspond to a fixed level of risk (i.e., either one in a million (10^{-6} cancer risk or a noncarcinogenic hazard quotient of 1).

TABLE 3
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)
AND TO BE CONSIDERED MATERIAL (TBC) FOR THE
INDUSTRIAL EXCESS LANDFILL SITE

ARAR or TBC	Legal Citation	Classification	Summary of Requirement	Further Detail Regarding ARARs in the Context of the Remedy
II. ACTION-SPECIFIC				
1. Capping/containment of wastes (Applies to Alternative 2 only)				
a. State design/operating reqmts. for hazardous waste landfills	OAC 3745-57-03(A) through (I)	Relevant and Appropriate	Establishes design and operating reqmts. For hazardous waste landfills.	Pertains to cap/gas system design.
b. State performance standards for land-based units	OAC 3745-57-01(A) through (D)	Relevant and Appropriate	Performance standards for waste management units, including landfills.	Pertains to cap/gas system design.
c. State reqmts. for general landfill closure, applicable performance stds. associated with landfill closure and post-closure care	OAC 3745-57-10(A) & (B), 3745-55-11(A)-(C) and 3745-55-17(B)	Relevant and Appropriate	3745-57-10(A) & (B): State standards for closure and post-closure care for landfill, incl. final cover & maintenance; 3745-55-11(A)-(C): Requires that all haz. waste facilities be closed in a manner that minmizes need for further maintenance and controls: 3745-55-17(B): Specifies post-closure reqirements, incl. maintenance, monitoring, and post-closure use of property.	
2. Monitored Natural Attenuation (MNA)				
Use of monitored natural attenuation at Superfund, RCRA, Corrective Action, and Underground Storage Tank Sites, April 1999	OSWER Directive 9200.4-17P	To Be Considered	This policy provides guidance for evaluating and approving monitored natural attenuation remedies	This policy shall be considered during implementation of chosen remedy for IEL.

TABLE 3
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)
AND TO BE CONSIDERED MATERIAL (TBC) FOR THE
INDUSTRIAL EXCESS LANDFILL SITE

ARAR or TBC	Legal Citation	Classification	Summary of Requirement	Further Detail Regarding ARARs in the Context of the Remedy
3. Stormwater Discharge				
NPDES Stormwater Discharge Requirements	40 C.F.R. 122.26(a)	Applicable	Stormwater discharge requirements under the NPDES program.	NPDES permits are required for discharges associated with industrial activity, which the regulation defines to include landfills that have received industrial wastes. However, because of the CERCLA §121(e) permit exemption, only substantive requirements of the NPDES regulations are applicable.
4. Landfill Gas Management				
Stack height requirements	OAC 3745-16-02(B) and (C)	Applicable	Establishes allowable stack height for air contaminant sources based on good engineering practice.	This provision is applicable to any stack associated with gas treatment at IEL if the stack is a source air contaminants.
Particulate non-degredation policy	OAC 3745-17-05	Applicable	Degradation of air quality is prohibited in any area where air quality is better than required by 3745-17-02 (non-degradation policy).	Pertains to stack emissions from expanded methane venting system.
Organic emissions control from stationary sources.	OAC 3745-21-07(A), (B), (G), (I), and (J)	Applicable	Requires control of emissions of organic materials from stationary sources. Requires best available technology.	Pertains to emissions from expanded methane venting system which is expected to emit organic material.
Carbon monoxide (CO) control from stationary sources.	OAC 3745-21-08(A) through (E)	Applicable	Requires any stationary source of CO to minimize emissions by the use of best available control technologies and operating practices in accordance with best current technology.	Pertains to emissions from expanded methane venting system which is expected to emit carbon monoxide.

TABLE 3
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)
AND TO BE CONSIDERED MATERIAL (TBC) FOR THE
INDUSTRIAL EXCESS LANDFILL SITE

ARAR or TBC	Legal Citation	Classification	Summary of Requirement	Further Detail Regarding ARARs in the Context of the Remedy
Standards for total suspended particulates.	OAC 3745-17-02(A), (B), and (C)	Applicable	Establishes specific standards for total suspended particulates.	Relevant for stack emissions from expanded methane venting system and construction activities.
5. Remedy Construction Activities				
Worker Safety	29 C.F.R. 1910.120	Applicable	Establishes proper training and personal protection requirements for workers who have reasonable potential to be exposed to hazardous substances while performing job functions at the site.	Workers shall be properly trained and shall wear appropriate personal protection equiptment for activities conducted at the Industrial Excess Landfill Site.
State rules governing grading, excavating, etc. at sites containing hazardous or solid wastes	ORC 3734.02(H)	Relevant and Appropriate	Prohibition against filling, grading, excavation, building, drilling, or mining on land where a hazardous or solid waste facility was operated, without prior authorization from OEPA.	
State prohibitions on certain air emissions from a hazardous waste facility.	ORC 3734.02(I)	Applicable (to construction activities)	No hazardous waste facility shall emit any particulate matter, dust, fumes, gas, mist, smoke, vapor, or odorous substance that interferes with the comfortable enjoyment of life or property or is injurious to public health.	Pertains to any site which hazardous waste will be managed such that air emissions may occur. Consider for sites that will undergo movement of earth or incineration.
Fugitive dust control.	OAC 3745-17-08	Applicable	Emissions of fugitive dust shall be controlled at sites where it may be be generated due to certain activities (e.g., grading, loading, demolition, clearing, grubbing, etc.).	Pertains to clearing, grubbing, cap installation, and excavation operations during construction of cap/gas system.

TABLE 3
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)
AND TO BE CONSIDERED MATERIAL (TBC) FOR THE
INDUSTRIAL EXCESS LANDFILL SITE

ARAR or TBC	Legal Citation	Classification	Summary of Requirement	Further Detail Regarding ARARs in the Context of the Remedy
Standards for total suspended particulates.	OAC 3745-17-02(A), (B), and (C)	Applicable (to construction activities)	Establishes specific standards for total suspended particulates.	Relevant for stack emissions from expanded methane venting system and construction activities.
Nuisance control/prohibition	OAC 3745-15-07(A)	Applicable	Defines air pollution nuisance as the emission or escape into the air from any sources(s) of smoke, ashes, dust, dirt, grime, acids, fumes, gases, vapors, odors, and combinations of the above that endanger the health, safety, or welfare of the public or cause personal injury or property damage, such nuisances are prohibited.	Applies to activities that may cause nuisances, such as excavation, cap construction, demolition of buildings, etc.
6. Well Abandonment				
State requirements for well abandonment	OAC 3745-9-10	Applicable	State requirements for well abandonment	Obsolete wells will be abandoned in accordance with State standards.
III. LOCATION-SPECIFIC Hazardous Waste Facilities and Old Landfills				
Monitoring for explosive gases at sanitary landfills.	OAC 3745-27-12(A), (B), (D), (E), (M), and (N)	Applicable	Monitoring requirements for explosive gases at sanitary landfills	This requirement will be covered under long-term monitoring plan for the site
Requirements for non-methane organic compound (NMOC) emissions at old landfill sites.	OAC 3745-76	Relevant and Appropriate	Establishes standards for the control of NMOC emissions from old landfill sites. Covers definition, test methods, performance standards, and record-keeping requirements.	IEL gas treatment system must meet these standards before operating in a passive mode.

TABLE 3
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)
AND TO BE CONSIDERED MATERIAL (TBC) FOR THE
INDUSTRIAL EXCESS LANDFILL SITE

ARAR or TBC	Legal Citation	Classification	Summary of Requirement	Further Detail Regarding ARARs in the Context of the Remedy
III. LOCATION-SPECIFIC (cont.) Hazardous Waste Facilities and Old Landfills				
State prohibitions on certain air emssions from a hazardous waste facility.	ORC 3734.02(I)	Applicable	No hazardous waste facility shall emit any particulate matter, dust, fumes, gas, mist, smoke, vapor, or odorous substance that interferes with the comfortable enjoyment of life or property or is injurious to public health.	Pertains to any site which hazardous waste will be managed such that air emissions may occur. Consider for sites that will undergo movement of earth or incineration.
Prohibition of nuisances	ORC 3767.13(A)	Relevant and Appropriate	Prohibits noxious exhalations or smells.	Pertains to any site that may have noxious smells.
OAC regulations governing groundwater protection.	OAC 3745-54-90 et seq	To be Considered	Requires landfill permits to include standards that ensure protection of groundwater. Substantive requirements only.	Under CERCLA §121(e)(1), no permit is required at IEL. But, in order to protect groundwater, substantive permit standards will be considered in designing the IEL monitoring program.

3.5 Formulation of Remedial Alternatives

There are three remedial alternatives to be analyzed and compared:

Alternative 1 - No Action

"No action" is included in every EPA remedy comparison. It serves as a kind of baseline from which to judge active remedial alternatives. In this case, "no action" means "maintaining the status quo" rather than strict no action, since we do not intend to halt the operation of the existing methane venting system.

Alternative 2 - March 2000 ROD Amendment Remedy

- Modified RCRA cap
- Natural attenuation of offsite contamination
- Expanded methane venting system (MVS)
- Monitoring of cap, ground water, and MVS
- Perimeter fencing
- Deed restrictions

Alternative 2 is the current IEL remedy, as set forth in the Amended Record of Decision, signed on March 1, 2000.

Alternative 3 - Augmented Vegetative Cover/Monitored Natural Attenuation

- Augmented vegetative cover
- Natural attenuation of both offsite and onsite groundwater contamination
- Monitoring of ground water and landfill gas

- Perimeter fencing
- Deed restrictions
- Maintenance of the interim measure that supplied public water to residents west of the site
- Additional design studies

Alternative 3 is essentially the proposal the Responding Companies made to EPA in their petition of November 14, 2000. A more detailed description of its components follows.

***Augmented Vegetative Cover**:* Additional trees/plants would be planted in areas of the landfill that have less vegetative growth than other parts of the site. Figure 5 shows the current ecological regimes found at the site, while Figure 6 depicts the areas where additional trees and other plants would be planted. To the extent possible, the same type of tree species currently found in the landfill (e.g., poplars) would be used in the plantings. Due to the marshy conditions and the slope found along the eastern edge of the landfill, the type of vegetation that could be planted on this area may be limited to low-lying shrubs or grasses. Figure 7 shows the future ecological regimes to be found at the site after the trees and other plants have been planted and established at the site.

The purpose of the augmented vegetative cover is three-fold: (1) To provide a varied habitat for wildlife and increase the biodiversity of the site; (2) to aid the natural attenuation of subsurface contaminants; and (3) to reduce the infiltration of water into the waste mass below. With respect to the first objective, a PRP-led biological survey conducted in 1999-2000 identified a thriving and diverse ecosystem (wetlands, grassland, forest edge, and woodlands), diverse wildlife, and flora. Based on these findings, the authors recommended various habitat enhancements (e.g., nesting program for birds, promoting a balanced predator/prey

relationship, controlling invasive species, etc.) that could be largely accommodated with the augmented vegetative cover being proposed.

With respect to the second objective, EPA anticipates that natural attenuation processes will benefit from planting additional trees and other plants in the landfill. The various ways plants are able to clean up, or remediate, contaminated sites such as IEL by removing contaminants from the soil and water are described in more detail in the attached phytoremediation guidance (Appendix B). The use of living plants to remove, degrade, or contain organic and inorganic contaminants in soil or ground water is a passive technique to clean up sites with low to moderate levels of contamination, as is the case at IEL. Although experience with full-scale application of this technology at Superfund sites is limited, phytoremediation has been studied extensively in research and small-scale demonstration projects. Studies have shown that plant roots affect soil conditions by increasing aeration and moderating moisture. This provides an environment in which indigenous microorganisms (yeast, fungi, or bacteria) break down organic contaminants (food source) into smaller, less harmful products. This process is called biodegradation. Another possible mechanism for contaminant degradation is metabolism within the plant. Trichloroethylene (TCE) may degrade in certain tree species, such as poplar, with the carbon used for tissue growth while the chloride is expelled through the roots.

As for the third objective: preliminary calculations show an enhanced vegetative cover to be capable of removing enough water to render the portion percolating through the soil/waste mixture to be minimal. Computer modeling (HELP) indicates the existing vegetative cover at IEL allows about 10 inches of infiltration yearly, based on an annual precipitation of 36.8 inches. With additional plants, it may be possible that up to 90 percent of the annual precipitation may be prevented from

ever penetrating the soil layer, leaving about 4 inches of rainwater to percolate. With a calculated total water holding capacity (existing soil cover + top 5 feet of waste) of around 6.5 inches, it is conceivable that the enhanced vegetative cover may effectively prevent as much infiltration as a conventional cover. (see Appendix B and D for details). There is a caveat to this - the plants' ability to reduce infiltration is dependent, to a large degree, on the season. It is expected the plants will not be very effective during the dormant season where there is significant moisture (snow/ice) on the ground. Thus, the plants' ability to minimize the amount of water percolating to the ground is not expected to be consistent throughout the year. In any event, it must be emphasized that EPA is not advocating the enhanced vegetative cover as a containment remedy. To the extent that it does in fact achieve containment by preventing water from percolating into the waste mass, well and good. But EPA does not view the possibility that water may from time to time infiltrate the waste mass to be a reason to reject the vegetative cover. Based on a review of nearly two decades of IEL groundwater data, EPA believes that some infiltration into the waste mass can occur without any significant negative effect.

Natural attenuation of both offsite and onsite groundwater contamination: A principal objective of this alternative is to let natural attenuation processes continue within the landfill, complementing what is currently occurring in the offsite areas. By doing so, EPA believes that ground water throughout the site will eventually meet drinking water standards. EPA's confidence that natural attenuation is occurring and that it will continue to clean up contamination at the landfill in a satisfactory manner is based on the following considerations:

- Groundwater data from 1985 to the present has been available to EPA for review. In all, results from fourteen (14) rounds of groundwater surveys were

available to the Agency since 1990. As previously stated, the data demonstrated that groundwater contaminants are generally decreasing in both concentrations and in the frequency of detection over time. Data from 1997 and 1998 was used to determine that a groundwater plume of contamination outside of the landfill no longer exists.

- Existing hydrologic and geochemical conditions, which have made possible the trend towards improving groundwater quality, are expected to be the same with Alternative 3 because this alternative will continue allowing dissolved oxygen and nutrients through the existing vegetative cover. Alternative 2 may change these existing conditions by not allowing these same elements through its impermeable cover.

- Based on landfill gas data, it does not appear that landfill contaminants are migrating to this medium. In fact, the levels of major landfill gases such as carbon dioxide and methane continue to diminish over time.

- The presence of breakdown products (i.e., daughter compounds) near the edge of the landfill, such as vinyl chloride, has been observed over the years.

- Concentrations of inorganics such as metals appear to be stable or decreasing. Studies conducted by responding parties in 1997 on possible degradation mechanisms for metals at IEL suggested sorption or precipitation as the most likely routes. If this assessment is accurate, the mobility, toxicity, and/or bioavailability of these class of compounds has been more or less mitigated.

- EPA studies in the early 1990's found no evidence of dense non-aqueous phase liquids (DNAPLs) in the landfill.

EPA's conclusion that the IEL site is a good candidate for monitored natural attenuation is supported by Agency guidance in this area, specifically - "Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites" (OSWER Directive 9200.4-17P), an EPA guidance document issued in April 21, 1999. The guidance sets forth a number of factors to consider in determining whether natural attenuation is appropriate for a given site:

- Whether the contaminants present in soil or ground water can be effectively remediated by natural attenuation processes.

As noted above, data collected over a twenty-year period show that VOCs in ground water have been greatly reduced. The presence of natural breakdown products, such as vinyl chloride, indicate that natural attenuation has been at work.

- Whether or not the contaminant plume is stable and the potential for the environmental conditions that influence plume stability to change over time.

There is no indication of a plume at IEL. EPA does not foresee any likely change in environmental conditions that would alter this situation.

- Whether human health, drinking water supplies, other groundwaters, surface waters, ecosystems, sediments, air, or other environmental resources could be adversely impacted as a consequence of selecting MNA as the remedial option.

EPA sees little possibility of an adverse impact on human health or drinking water supplies. Residents living near the landfill who are downgradient are connected to a municipal water system. In the event of an unexpected, negative change in groundwater quality, EPA would have ample time to address it before

contamination reached any potential receptors. Nor does EPA foresee an adverse impact on other groundwaters, surface waters, ecosystems, sediments, air or other environmental resources as a result of choosing MNA rather than a containment remedy. To date, EPA has not seen any impact of groundwater contamination at IEL on surface waters, ecosystems, sediments, or other environmental resources. EPA sees no reason why this should change during the time natural attenuation continues to improve groundwater quality. As for any possible contribution of contamination from ground water to the air via landfill gas emissions while MNA is underway, the methane venting system at the landfill will handle that as it has to date.

- Current and projected demand for the affected resource over the time period that the remedy will remain in effect.

EPA is unaware of any demand for the ground water within the 30 acre boundaries of IEL. Outside the site, ground water is already meeting, for the most part, drinking water standards.

- Whether the contamination, either by itself or as an accumulation with other nearby sources (on-site or off-site), will exert a long-term detrimental impact on available water supplies or other environmental resources.

EPA sees little possibility of this. Already, groundwater contamination appears to be largely confined to the landfill itself. As natural attenuation continues, even ground water onsite should reach drinking water standards. EPA therefore expects no long-term detrimental impact on available water supplies or other environmental resources.

- Whether the estimated time frame of remediation is reasonable compared to time frames required for other more active methods.

The amount of contamination coming off the landfill in ground water in recent years is so small that it does not lend itself to an active remedy, such as a pump-and-treat system. For that reason, in March 2000, EPA eliminated the pump-and-treat component of the original remedy. Hence, at IEL, it is not a question of comparing MNA to an active remedy since no active remedy, other than gas venting that is already in operation, is practicable. The comparison at issue is between an inactive remedy - containment - and MNA. As between those two alternatives, MNA is preferable even if it takes a long time because it offers the possibility of eventually cleaning up the site, while containment does not.

- The nature and distribution of sources of contamination and whether these sources have been or can be adequately controlled.

Wastes were disposed of throughout the 30-acre landfill, although liquid wastes were at times concentrated in a lagoon, located in the west-central part of the property. Source control actions to date consist of the placement of a soil/vegetative cap over the landfill just after its closure in 1980. While this cap does not completely prevent the infiltration of surface water into the waste mass, it does reduce it. Ground water data gathered over time indicate that the degree of source control provided by the current cap is sufficient, as evidenced by the lack of a contaminant plume at the site.

- Whether the resulting transformation products present a greater risk due to increased toxicity and/or mobility than do the parent contaminants.

One of the contaminants of concern found in the landfill is 1,2 dichloroethane. Its breakdown product - vinyl chloride - is indeed more toxic than the parent compound. But, while vinyl chloride has been found in ground water at IEL (as we would expect if natural attenuation is occurring), the concentrations are low - near its MCL of 2 ppb - such that the increase in the toxicity of the daughter compound is not a significant concern.

- The impact of existing and proposed active remediation measures upon the monitored natural attenuation component of the remedy, or the impact of remediation measures or other operations/activities in close proximity to the site.

The sole active component of the remedy is the methane venting system. This operates to remove some VOCs from the soil and ground water at the site in the process of extracting and venting landfill gases. EPA sees no negative effects on natural attenuation. EPA knows of no other operations/activities in close proximity to the site that might have an impact on natural attenuation.

- Whether reliable site-specific mechanisms for implementing institutional controls (i.e., zoning ordinances) are available, and if an institution responsible for their monitoring and enforcement can be identified.

EPA believes that deed restrictions could be drafted for the IEL site that would preclude the use of the property in ways that would interfere with natural attenuation or would increase the risk of exposure to contamination. Monitoring and enforcement of the land use restrictions could be made part of a settlement agreement for the IEL site.

Monitoring of Ground Water and Landfill Gas: The current groundwater monitoring network would be upgraded by installing new wells and abandoning others, as appropriate. A long-term groundwater monitoring program would be instituted in order to: 1) ensure natural attenuation processes are degrading contaminants of concern in a timely manner; 2) track progress in meeting cleanup goals along the western edge of the landfill; and 3) provide adequate notice, via off-site monitoring wells, of groundwater contaminants migrating toward areas still dependent upon residential wells for drinking water. Monitoring of gas would be required to evaluate threats, if any, to offsite homes and businesses as well as to onsite visitors.

Perimeter Fencing: The current fence around the perimeter of the landfill is deteriorating. It would be replaced and maintained until such time as it could be shown that there are no risks to those entering the landfill property.

Deed restrictions: Prohibitions on drinking water wells and residential development within the site boundaries would be included in deeds to the property, until such time as it could be shown that there are no risks associated with drinking water wells or residential development on the property.

Maintenance of interim measure that supplied public water to residents west of the site: The municipal water supply to the area designated in EPA's 1987 ROD needs to be maintained. Given the continued operation of the municipal water supply, in the event that any groundwater contaminants migrated away from the landfill, residents in this area would not be adversely affected.

Additional Design Studies: Design studies that include: 1) investigating elevated benzene levels in the north-central portion of the landfill; 2) a site-wide evaluation

of landfill gas emissions to determine the appropriate means of gas control (i.e., passive or active); 3) investigating metallic objects detected along western edge of landfill during the October 2000 field survey work performed by the Responding Companies; and 4) an analysis of risks, if any, associated with the projected land use for the site: a nature preserve with possible public access and recreational use.

4.0 DETAILED ANALYSIS OF ALTERNATIVES

4.1 Description of Evaluation Criteria

Each alternative described above must be evaluated against the nine criteria established under §300.430(e)(9)(iii) of the NCP before a remedy is selected for the site. The evaluation criteria are separated into three groups, based upon their application to the evaluation process:

1. *Threshold Criteria:*

The threshold criteria relate to statutory requirements that each alternative must satisfy in order to be eligible for selection.

- Overall Protection of Human Health and the Environment - This criterion describes how the alternative, as a whole, protects and maintains protection of human health and the environment. The overall assessment of protection is based on a combination of the other criteria, including long-term effectiveness and permanence, short-term effectiveness, and compliance with ARARs. In effect, this criterion is a final check to assess each alternative.

- Compliance with ARARs - This criterion assesses compliance with federal and state ARARs. The detailed analysis summarizes requirements which are applicable or relevant and appropriate to an alternative. The analysis also summarizes the ability of an alternative to fulfill these requirements. If an ARAR is not met, the justification must be discussed fully.

2. *Balancing Criteria*

Balancing criteria are the technical criteria upon which the detailed analysis is primarily based.

- Long-term Effectiveness and Permanence - Examines the protection of human health and the environment after construction and implementation of the remedial alternative. This criterion addresses the long-term adequacy, reliability, and permanence of the remedial alternative and the magnitude of the risk posed by treatment residuals and/or untreated wastes.

- Reduction of Toxicity, Mobility, or Volume - Examines the extent to which the remedial alternative achieves the statutory preference for remedial actions which permanently and significantly reduce the toxicity, mobility, and volume of contaminants.

- Short-term Effectiveness - Examines the protection of the community, worker health, and environment during construction and implementation of the remedial alternative. This criterion also evaluates the time required to implement and achieve remedial response objectives.

- Implementability - Considers the technical and administrative feasibility of each alternative, as well as availability of required resources. Factors considered in assessing this criterion include construction, reliability, operation, and maintenance of the remedial alternative, potential problems which may be encountered during the implementation of an alternative,

required approvals and permits from regulatory agencies, availability of required off-site treatment or disposal services, and availability of necessary equipment, materials, and personnel.

- Cost - Involves development and evaluation of the capital cost of construction, equipment, buildings, engineering, services, and project administration, and operation and maintenance (O & M) costs of labor, spare parts, materials, and administration. In addition, the present worth of annualized costs associated with each alternative are calculated using an annual discount rate of 7% before taxes and after inflation. Costs are then compared on a common, present-worth basis in terms of a base year. The level of detail employed in developing these estimates is considered appropriate for making choices between alternatives, but the estimates are not intended for use in budgetary planning.

3. *Modifying Criteria*

- State Acceptance - Identifies the State's apparent preference or concerns about alternatives.
- Community Acceptance - Identifies the community's apparent preferences or concerns about alternatives.

4.2 Alternatives Analysis

4.2.1 Alternative 1 - No Action

1. *Overall Protection of Human Health and the Environment:* The No Action alternative does not provide adequate protection of human health and

environment. The existing fence needs to be replaced in order to adequately prevent unauthorized access to the site. While the MVS continues to prevent off-site migration of landfill gas in an acceptable manner, there is uncertainty if the present level of landfill gas poses undue risk to authorized personnel working onsite. Lastly, there is no provision which tracks groundwater contaminant levels in and around the landfill, enabling regulatory agencies to take appropriate measures in case contaminants threaten to reach residential wells downgradient from the landfill.

2. *Compliance with ARARs:* ARARs do not pertain to "no action" decisions. ARARs only come to bear on plans for active remedial measures.

3. *Long-term Effectiveness and Permanence:* Not effective. The MVS system, along with associated extraction and collection wells, has been operating since 1987. It is not known how long this system will continue to operate in an acceptable manner. The existing fence, segments of which are in various stages of disrepair, may not be adequate in preventing unauthorized persons from entering the site in the future. This alternative does not provide a means to track the progress of natural attenuation in degrading contaminants in the ground water and to estimate how long it will take to meet cleanup goals.

4. *Reduction of Toxicity, Mobility, and Volume:* Deficient. Natural attenuation may be occurring, but without adequate monitoring, there can be no assurance that contaminants are decreasing over time.

5. *Short-term Effectiveness:* There are no short-term impacts associated with implementation of the no action alternative because no construction or

monitoring activities, other than what the Responding Companies already have under way, will be performed.

6. *Implementability:* Since no remedial design is included in this alternative, no design, construction, or technical difficulties are associated with its implementation. In addition, no permits or other administrative actions will be necessary.

7. *Cost:* With the exception of operating the existing MVS, no capital or annual operation and maintenance costs are expected with this alternative. The costs of operation and maintenance of the MVS are projected to be $390,000.

8. *State Acceptance:* Due to the failure of this alternative to establish enforceable cleanup objectives, State acceptance of the no action alternative is not expected.

9. *Community Acceptance:* Based on previous dealings with local government officials and community groups, the no action alternative is not expected to be acceptable to the community.

4.2.2: Alternative 2 - March 2000 ROD Amendment Remedy: 1) Modified RCRA cap, 2) Natural attenuation of off-site contamination, 3) Expanded MVS, 4) Monitoring cap, ground water, and MVS, 5) Perimeter Fencing, 6) Deed restrictions.

Alternative 2 is described in more detail in the March 2000 ROD Amendment. For convenience, the following evaluation summary is provided:

1. *Overall Protection of Human Health and the Environment:* Protective. Monitoring of natural attenuation will allow timely intervention if any unexpected increase of contamination occurs. Cap will prevent direct contact with waste.

2. *Compliance with ARARs:* Complies with ARARs. EPA expects ground water outside of landfill to meet drinking water standards. It already meets MCLs for VOCs.

3. *Long-term Effectiveness and Permanence:* Provides long-term effectiveness and permanence by reducing level of contamination off-site.

4. *Reduction of Toxicity, Mobility, or Volume:* Reduces levels of contaminants in ground water outside the landfill. Also, toxicity/mobility/volume/ of contaminants in the landfill gas will be reduced through continued operation of the MVS.

5. *Short-term Effectiveness:* Construction of the cap will present little risk to the community. There will be a temporary increase in the volume of traffic along the main road during construction.
6. *Implementability:* Cap is proven technology and easily implementable. MNA is passive type of treatment requiring minimal oversight.

7. *Cost:* $13,665,709 (1997$)

8. *State Acceptance:* State concurred with this remedy alternative during the public comment period leading to the March 2000 ROD Amendment.

9. *Community Acceptance:* Not supported by either local government officials nor local community groups during public comment period leading to the March 2000 ROD Amendment.

4.2.3: Alternative 3 - Augmented vegetative cover, Natural attenuation of offsite and onsite groundwater contamination, Monitoring of ground water and landfill gas, Perimeter fencing, Deed restrictions, Maintenance of interim measure that supplied public water to residents west of the site, Additional design studies.

1. *Overall Protection of Human Health and the Environment:* Protective. EPA believes that all significant risks posed by the landfill are addressed under this alternative. The main risk - ground water contamination - is addressed by natural attenuation through which ground water both offsite and onsite should eventually meet drinking water standards. The risks from gas are addressed by operation of the MVS, while the risks from direct contact with wastes are addressed by improving and maintaining the vegetative cover over the site. Long-term monitoring will ensure that any unexpected change in site conditions will be detected and addressed, long before it could adversely affect human health or the environment.

2. *Compliance with ARARs:* Will comply with ARARs. EPA expects that ground water both offsite and onsite will ultimately meet MCLs.

3. *Long-term Effectiveness and Permanence:* EPA has been monitoring ground water at IEL for many years. As a result, the Agency is relying

on the historical pattern at the site, rather than on theoretical projections, to assess the prospects for natural attenuation. EPA believes that the site conditions promoting natural attenuation are permanent, and that they will continue to operate over time, ensuring that any contaminants entering ground water from the wastes buried in the landfill degrade naturally into harmless bi-products long before they reach any potential receptors.

EPA believes that maintaining the vegetative cover over the landfill over the long term will not be difficult. Current site conditions indicate trees and other vegetation are thriving in the landfill. It is expected that, with proper care, the additional trees and other vegetation planted will also thrive. Based on information from other sites planted with trees and vegetation, a percentage the original plantings is expected to die off and will need to be replaced.

4. *Reduction of Toxicity, Mobility, and Volume:* Breakdown of contaminants by natural attenuation processes is expected to be aided by the phyto component of remedy, accelerating the time frame for achieving cleanup goals.

5. *Short-term Effectiveness:* There will be considerably fewer vehicles entering the site during construction, compared to Alternative 2, minimizing possibility of road accidents or mishaps. Construction will be done sooner - planting of trees and other vegetation should be completed in within one construction season. The time required to meet cleanup objectives is expected to be shorter than Alternative 2 due to enhanced phytoremediation from the additional trees and plants.

6. *Implementability:* Easily implemented. Primary concern is providing essential nutrients, along with adequate moisture, to maximize number of trees/plants that will survive to maturity (2-3 years). Agronomic data on what plant species is best suited for a particular climate in the U.S., soil/nutrient information, etc. is readily available from various sources, including federal agencies such as the Department of Agriculture.

7. *Cost:* $7,074,162 (2000 $). See Appendix E for a more detailed cost breakdown. A net present value analysis, capital, and operations & maintenance (O & M) costs were tabulated over the life of the project (30 years). Using Alternative 2 as the baseline cost for a conventional alternative, the innovative technology associated with Alternative 3 represents about a 50% reduction in cost.

8. *State Acceptance:* The State is expected to concur with this alternative remedy.

9. *Community Acceptance:* Lake Township has indicated verbally and in writing that it generally supports this remedial alternative.

4.3 Comparative Analysis of Alternatives

This section compares the relative strengths and weaknesses of Alternatives 1, 2, and 3. Table 4 presents a summary of this comparison in terms of the nine-criteria evaluation.

Table 4 Summary of Remedial Alternatives			
Evaluation Criteria	***Alternative 1 No Action***	***Alternative 2- March 2000 ROD Amendment***	***Alternative 3- Enhance vegetative cover, NA offsite and onsite, design studies***
1. Overall Protection of Human Health & Environment	Not Protective	Protective	Protective
2. Compliance with ARARs	N/A	Will meet ARARs	Will meet ARARs
3. Long-term Effectiveness and Permanence	No	Provides long-term effectiveness and permanence	Provides long-term effectiveness and permanence
4. Reduction of Toxicity, Mobility, and Volume (TMV)	No assurance that contaminants are decreasing over time	Reduce groundwater contaminants outside of landfill. Landfill gas contaminants reduced by use of MVS	Breakdown of contaminants by natural attenuation processes expected to be aided by phyto component
5. Short-term Effectiveness	No short-term impacts expected	Little risk to community. Temporary increase in truck traffic on main road	Lower risk to community than Alt. 2 due to less truck traffic
6. Implementability	Easily implemented	Easily implemented	Easily implemented
7. Cost	$390,000	$13,665,709 (1997$)	$7,074,162 (2000 $)
8. State Acceptance	State acceptance not expected	State previously concurred with this alternative	State receptive to this alternative
9. Community Acceptance	Community acceptance not expected	Was not supported by either local gov't or community group	Local gov't has expressed support for this alternative

4.3.1 Overall Protection of Human Health and the Environment

The No Action alternative (Alternative 1) does not provide adequate assurance that human health and the environment will be protected. Alternatives 2 and 3 both provide adequate protection of human health and environment, albeit in very different ways. Alternative 2 relies primarily on containment. It uses proven methods to isolate the wastes in the landfill, preventing contamination from leaching into ground water. Alternative 3, on the other hand, relies primarily on chemical transformation of the contaminants. It builds on the observed groundwater trends at the site which indicate that whatever contamination leaches into ground water is rendered harmless, long before it reaches any receptor.

4.3.2 Compliance with ARARs

Alternative 1 would not need to meet any ARARs because ARARs do not pertain to "no action" decisions. ARARs only come to bear on plans for active remedial measures. Nevertheless, it is clear that "no action" would not meet the standards enumerated as ARARs for the active alternatives. Alternatives 2 and 3 would comply with their respective sets of ARARs. Note that while Alternatives 2 and 3 share chemical-specific and location-specific ARARs, the action-specific ARARs for Alternatives 2 and 3 differ, in that action-specific ARARs for capping do not pertain to natural attenuation. Moreover, the point of compliance would differ between Alternatives 2 and 3: for Alternative 2, the point of compliance, i.e., the point at which groundwater ARARs would have to be met, would be the landfill boundaries. For Alternative 3, EPA would require groundwater ARARs to be met throughout the site, not just at the landfill boundaries.

4.3.3 Long-term Effectiveness and Permanence

There is no telling what the long-term effectiveness and permanence of Alternative 1 would be, because it does not call for any further monitoring. While natural processes would be at work at the site, EPA would not be able to determine how well they were working, and would not be in a position to intervene in a timely manner in the event that site conditions changed. The long-term effectiveness and permanence of Alternative 2 depends upon the continued integrity of the landfill cap. EPA requires caps to be designed and built to prevent infiltration of rain water and snow melt into the ground below. As long as they are properly maintained, they should continue to prevent infiltration indefinitely. But, continued operation and maintenance in perpetuity is required. Plants other than shallow-rooted grasses, etc. have to be continually eliminated. Continual vigilance must be maintained to restrict access and prevent activities on the surface that might impair the integrity of the cap. The long-term effectiveness and permanence of Alternative 3 on the other hand depends upon the maintenance of the conditions that promote natural attenuation at the site. These are natural conditions requiring far less tending than a conventional landfill cap. Some replacement of trees or plants may be necessary, but the ultimate objective is to leave the landfill as a natural system that maintains itself. In sum, Alternatives 2 and 3 would both provide long-term effectiveness and permanence; but this would require much more of an O&M effort with Alternative 2 than with Alternative 3.

4.3.4 Reduction of Toxicity, Mobility, and Volume

Under all three alternatives, landfill gas would be collected and treated through a gas venting system, and to this extent, all three alternatives satisfy CERCLA's preference for using treatment to reduce the toxicity, mobility and volume of

contamination. In addition, all three alternatives would reduce contaminant levels in the ground water offsite via natural attenuation. Because natural attenuation is not an active, engineered technology, EPA does not view it as satisfying the CERCLA preference for treatment. Nevertheless, in breaking down contaminants, thereby reducing the toxicity, mobility and volume of contamination, natural attenuation can achieve the same beneficial results as engineered treatment. As noted above, under Alternative 1, the degree to which natural attenuation achieves reductions in groundwater contamination would be a matter of speculation, since this alternative has no provisions for regular monitoring. Alternatives 2 and 3 on the other hand would both require regular monitoring so that reductions in toxicity, mobility and volume of contaminants could be assessed. Alternative 2 would give natural attenuation less to work on, in that its impermeable cap would prevent the creation of contaminant-laden leachate. Contamination would remain locked in the landfill. Alternative 3 would enhance natural processes ongoing at the site in an effort to speed up and increase the effectiveness with which contaminants degrade into benign byproducts. In so doing, Alternative 3 appears to have the best potential for reducing the toxicity, mobility and volume of contamination at the site.

4.3.5 Short-term Effectiveness

Alternative 2 will require an estimated thirteen thousand truckloads of soil to be brought to the site. This increased traffic along the main transportation route may potentially present risks to residents, primarily in the form of accidents involving trucks and other vehicles on the road. Construction activities associated with Alternative 2 are not expected to result in any health risks to residents or site workers, although there may be fugitive emissions as a result removing existing monitoring wells and putting a new gas collection/extraction system in place. To minimize this, some form of dust suppression may be necessary during these

activities. Alternative 3 will involve significantly less intrusive work on the landfill, along with significantly fewer materials trucked into the site.

4.3.6 Implementability

All of the alternatives can be implemented without any difficulties. Alternative 1 has no technical feasibility considerations since no design or construction work is planned. Alternative 2 is the presumptive remedy (i.e., containment) for sites such as IEL. Consequently, construction of the landfill cap/gas system at IEL is expected to be routine, having been used at numerous Superfund landfills nationwide. It is estimated construction would be completed in 18-24 months, with some time provided for shakedown of the system. Materials used in the cap/gas system are readily available (e.g., geomembrane, geonet, gas extraction well, etc.). Reliability of geomembrane and geonet, both constructed of synthetic materials, has been shown to be excellent under conditions like those found at IEL (e.g., repeated freeze/thaw). Maintenance of the cap would be minimal, primarily involving a visual inspection to ensure cover integrity is intact (e.g., check for ruts, leachate/erosion problems, etc.). The gas management system would be inspected and maintained to ensure gases are collected and treated per design specifications. Alternative 3, which is an innovative technology, involves the selective planting of trees and other plants in the landfill, requiring some expertise on tree planting, knowledge on nutritional needs of plants, and proper care to maintain healthy growth of the plants. Once the plants establish themselves (2-3 years after planting), a maintenance program to periodically check on the health of the mature plants would be instituted. If necessary, dying or deceased plants would be replaced to ensure the system integrity is maintained. It is estimated that it would require less than 12 months to complete installation of the vegetative cover. Design studies and investigations on benzene and landfill gas could be conducted

prior to planting and should be done in 6 months or less.

4.3.7 Cost

Alternative 1's sole cost is for operating and maintaining the current methane venting system over the long term ($390,000). Although Alternative 2's calculated cost ($13,665,709) is significantly higher than Alternative 3's ($7,074,162), there is a higher level of uncertainty associated with the true cost for Alternative 3 because the use of this innovative technology in Superfund projects has been limited so far.

4.3.8 State Acceptance

Alternative 1 is unacceptable to Ohio EPA. The State accepted the March 2000 remedy (Alternative 2) and is receptive to Alternative 3.

4.3.9 Community Acceptance

Alternative 1 is unacceptable to the community. The local government prefers Alternative 3 to Alternative 2, but has asked for further assurances that Alternative 3 will be sufficiently protective.

Appendix E: Capital Cost Estimate for the Enhanced Vegetative Cover Remedy

Industrial Excess Landfill (IEL) Superfund Site

Task Description	Quantity	Unit	Unit Cost ($)	Total ($)	Comments/assumptions
1. Mobilization / Demobilization	1	LS	$12,000	$12,000	for capital improvements year 1/2
2. Pre-Demo	1	LS	$206,000	$206,000	Work completed 2000 / 2001
Characterize/Remove/Dispose Investig'n-Derived Waste					
Geophysics/related investagions					
3. Demolish Buildings Along Cleveland Avenue					
Prepare plans through approval process	1	LS	$102,000	$102,000	Completed 5/01
Properly abandon 8 USTs	1	LS	$109,000	$109,000	Completed 6/01
Properly abandon 2 monitoring wells and 2 septic	1	LS	$21,000	$21,000	Completed 7/01
Demolish 3 buildings and dispose of waste	1	LS	$213,000	$213,000	Completed 7/01
Regrade and revegetate	1	LS	$5,000	$5,000	Completed 7/01
4. Remove debris from site and dispose	1	LS	incl.		Completed 7/01
5. Re-work monitoring well network					
Install new / replacement wells on-site, double case	6	ea.	$30,000	$180,000	
Install new wells off-site	4	ea.	$6,000	$24,000	
Properly abandon monitoring / observation wells	30	ea.	$5,000	$150,000	Assume 22@$4,000; 8@$7750
6. Enhanced Vegetative Cover					
Plant Trees (incl. Yr 1/2 replacements)	1	LS	$288,000	$288,000	
Patent Royalty to Ecolotree for selective planting	13.5	acres	$4,900	$66,150	
Plant Shrubs for edge environments	1	LS	$33,000	$33,000	
Establish grassland area through mowing	1	LS	$14,000	$14,000	
Remove invasive non-native species	1	LS	$8,000	$8,000	
Add soil / amendments to bare areas	1	LS	$62,000	$62,000	
7. Wildlife Management Improvements					
Consulting / coordinating / implementing nest boxes, raptor perches / bat boxes / dens (1 year of visits)	1	LS	$68,000	$68,000	
Edge environments / brush piles, etc.	1	LS	$3,000	$3,000	
Wildflower meadows / hummingbird gardens	1	LS	$13,000	$13,000	
8. Additional Studies	1	LS			
Natural attenuation study	1	LS	$52,000	$52,000	
Benzene study and remediation	1	LS	$397,000	$397,000	
Methane study	1	LS	$47,000	$47,000	
Tire Store dump study	1	LS	$83,000	$83,000	
CERCLA 5-year review	1	LS	$100,000	$100,000	
Subtotal				$2,256,150	
Engineering / Project Management @ 15%				$ 338,423	
Contingency @ 25%				$ 564,038	
Total				**$3,158,610**	

Summary of Net Present Value (NPV) Analysis

Industrial Excess Landfill (IEL) Superfund Site

Year	Capital Cost	Annual O&M Cost	Total Cost w/ (+3.5%/yr COLA)	NPV Discount Factor (7%)	Present Worth
0	**$ 3,158,610**		$3,158,610	1	$3,158,610
1		$543,890	$562,926	0.935	$526,099
2		$543,890	$582,629	0.873	$508,890
3		$543,890	$603,021	0.816	$492,244
4		$543,890	$624,126	0.763	$476,143
5		$543,890	$645,971	0.713	$460,568
6		$116,450	$143,147	0.666	$95,385
7		$245,230	$312,001	0.623	$194,299
8		$116,450	$153,342	0.582	$89,247
9		$245,230	$334,223	0.544	$181,795
10		$245,230	$345,921	0.508	$175,849
11		$34,250	$50,004	0.475	$23,757
12		$150,000	$226,660	0.444	$100,640
13		$34,250	$53,565	0.415	$22,228
14		$34,250	$55,440	0.388	$21,501
15		$150,000	$251,302	0.362	$91,084
16		$34,250	$59,389	0.339	$20,117
17		$34,250	$61,468	0.317	$19,459
18		$150,000	$278,623	0.296	$82,435
19		$34,250	$65,846	0.277	$18,207
20		$34,250	$68,150	0.258	$17,611
21		$150,000	$308,915	0.242	$74,607
22		$34,250	$73,004	0.226	$16,478
23		$34,250	$75,559	0.211	$15,939
24		$34,250	$78,204	0.197	$15,418
25		$150,000	$354,487	0.184	$65,314
26		$34,250	$83,774	0.172	$14,426
27		$34,250	$86,706	0.161	$13,954
28		$34,250	$89,741	0.150	$13,497
29		$34,250	$92,882	0.141	$13,056
30		$150,000	$421,019	0.131	$55,308
Total	$3,158,610	$5,067,540	$10,300,656	Total $$, NPV	**$7,074,162**

Notes:

O&M: Operations and Maintenance

COLA: Cost of Living Adjustment (Price Inflation, 3.5% per year)

LS Lump Sum